The GLAST Burst Monitor

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GBM Mission Objective

- The goal of the GLAST Burst Monitor (GBM) is to enhance the Science return of the Gamma Ray Large Area Space Telescope (GLAST) mission in the study of gamma-ray bursts. GBM will measure the spectra of bursts over a wide energy band and with high temporal resolution. The GBM will also detect bursts over a large solid angle. It will determine the directions to the bursts, to allow optional repointing of the main instrument.

GBM Collaboration

National Space Science & Technology Center

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Gerald Fishman
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On-board processing, flight software, systems engineering, analysis software, and management

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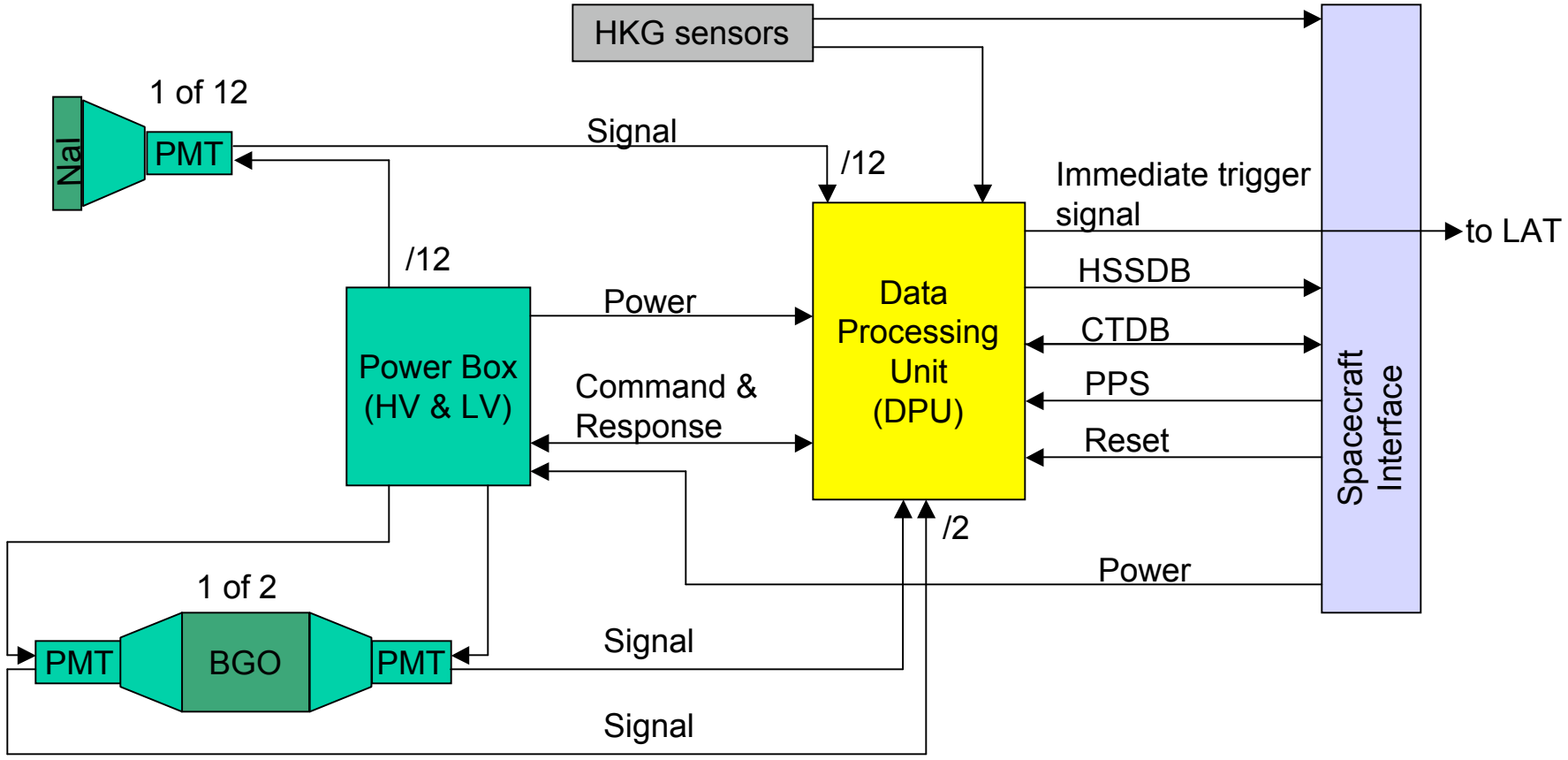
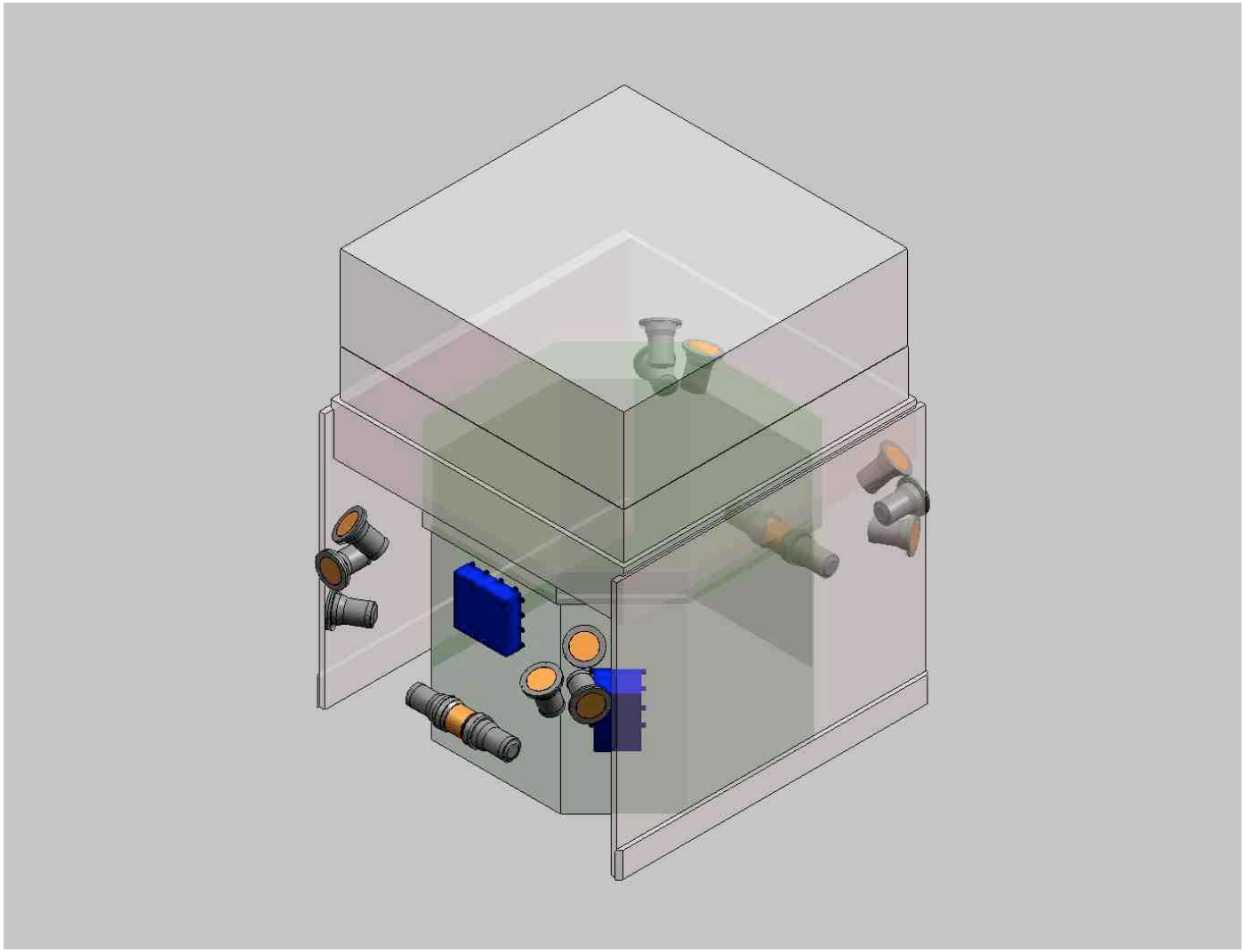
Volker Schönfelder
Roland Diehl
Jochen Greiner

Detectors, power supplies, calibration, and analysis software

Instrument Functional Diagram



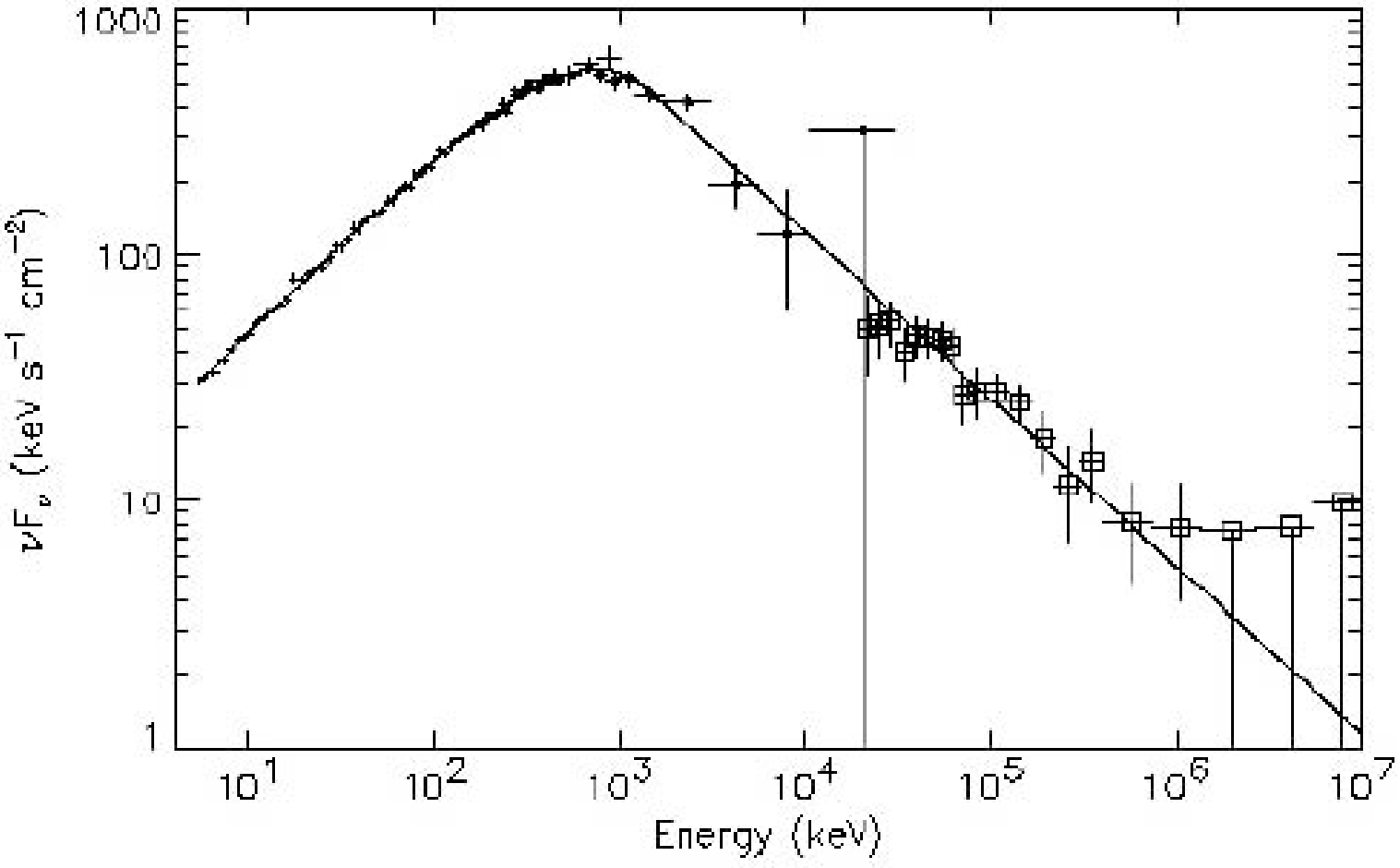
GBM Component Placement



GBM Requirements and Capabilities

Parameter	Requirement	Goal	Current Capability
Energy range	10 keV – 25 MeV	5 keV – 30 MeV	~5 keV – 30 MeV
Energy resolution	20% FWHM at 511 keV	(no stated goal)	~12% FWHM at 511 keV
Time resolution	10 microsecond	2 microsecond	2 microsecond
On-board GRB locations	20° accuracy (1σ radius) within 2 seconds	15° within 1 second	<15°; 1.8 seconds
Rapid ground GRB locations	5° accuracy (1σ radius) within 5 seconds	3° within 1 second	TBD by analysis (scattering influenced)
Final GRB locations	3° accuracy (1σ radius) within 1 day	(no stated goal)	TBD by analysis (scattering influenced)
GRB sensitivity (on ground)	0.5 photons cm^{-2} s^{-1} (peak flux, 50–300 keV)	0.3 photons cm^{-2} s^{-1} (peak flux, 50–300 keV)	0.35 photons cm^{-2} s^{-1} (peak flux, 50–300 keV)
GRB on-board trigger sensitivity	1.0 photons cm^{-2} s^{-1} (peak flux, 50–300 keV)	0.75 photons cm^{-2} s^{-1} (peak flux, 50–300 keV)	0.76 photons cm^{-2} s^{-1} (peak flux, 50–300 keV
Field of view	8 steradians	10 steradians	8.8 steradians
Deadtime	<10 μs/count	<3 μs/count	~2.5 μs/count

GRB Spectral Performance (GBM+LAT)



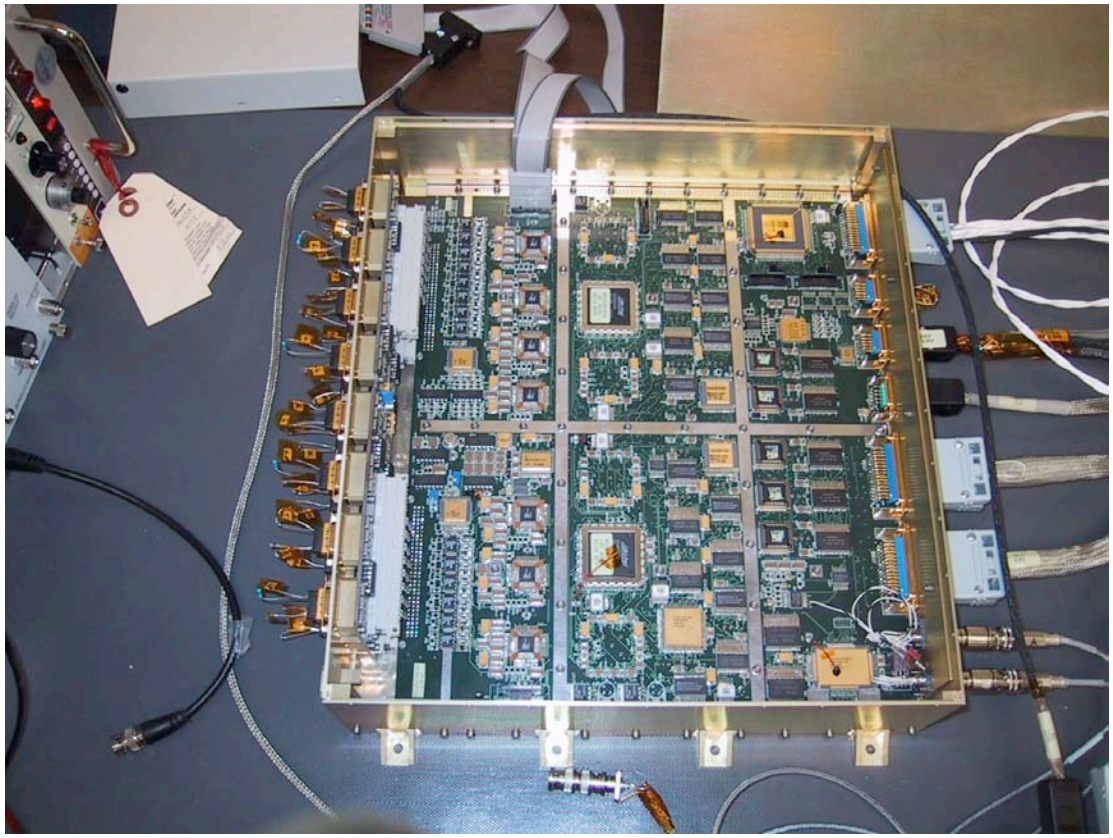
Simulated GBM and LAT response to time-integrated flux from bright GRB 940217

Data Types

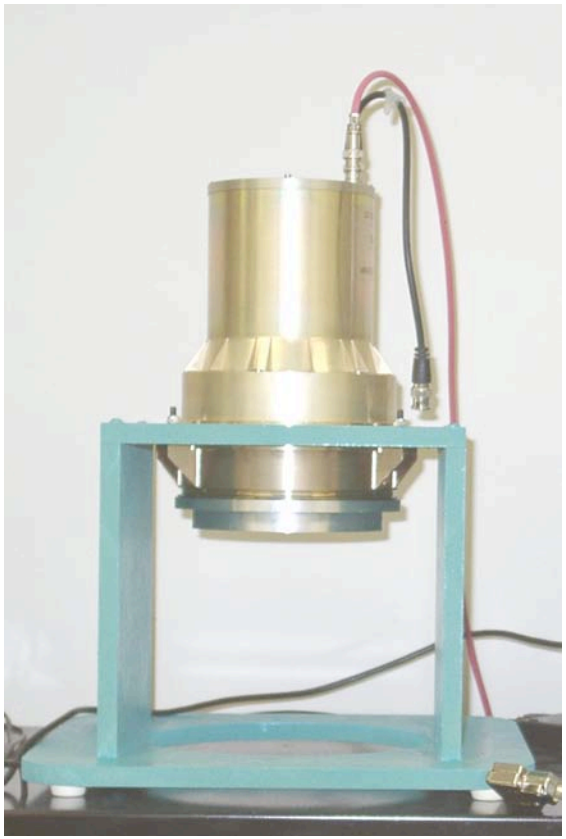
- **At All Times:**
  - **CTIME: 8 energy channels – 256 ms – all detectors**
  - **CSPEC: 128 energy channels – 8.192 s – all detectors**

- **During Bursts:**
  - **TTE: Time tagged events, 128 channels**
    - **Pre-trigger: 500,000 events**
    - **Post-trigger: ~300s, selected detectors**
  - **Alert Messages: real-time location, peak flux, fluence**

Engineering Hardware



Data Processing Unit



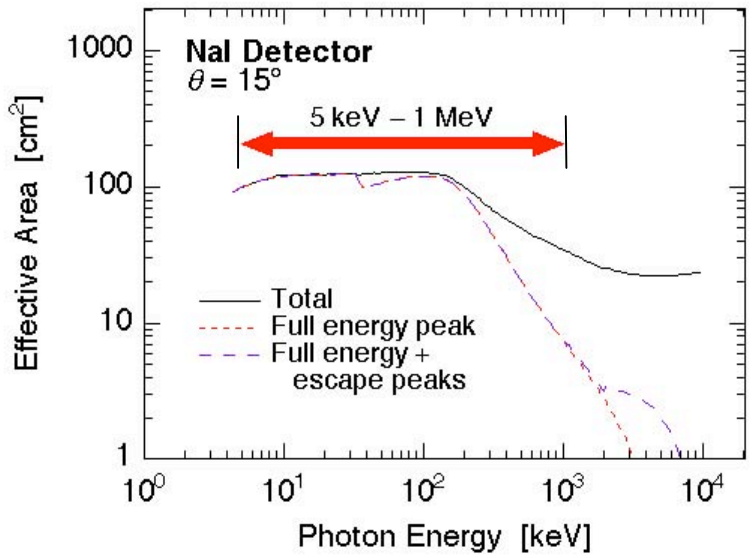
NaI Detector

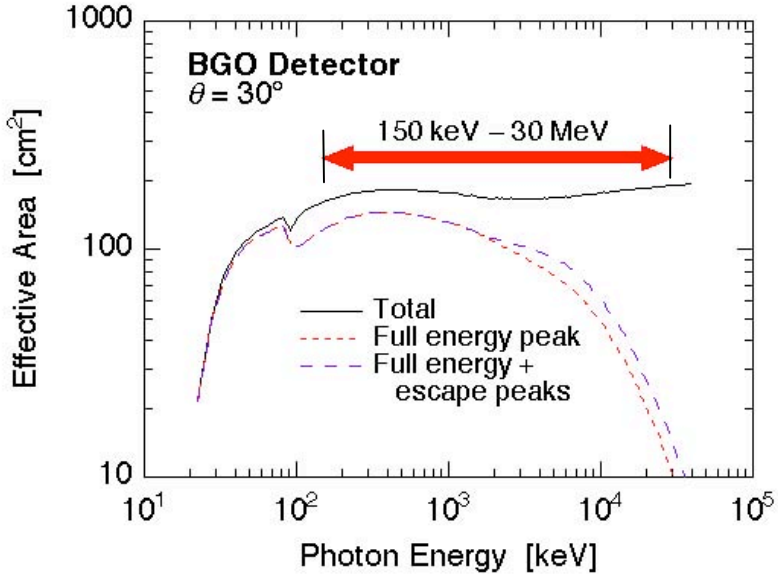
Science Investigations

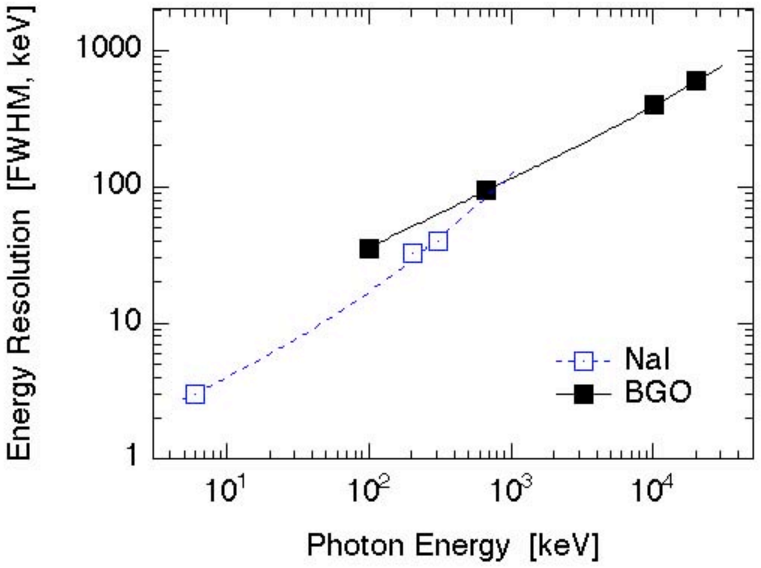
- **GBM Team Proposal:**
  - Time-resolved Spectroscopy of GRBs
  - Rapid Burst Locations
  - Burst Catalog, inc. Spectroscopy Catalog

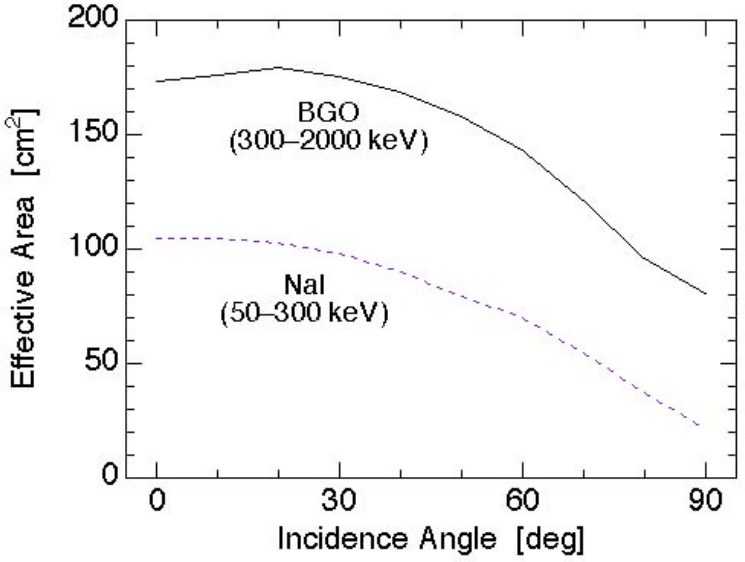
- **Other Possibilities (GI Program)**
  - Solar Flares
  - SGRs
  - Occultation Sky Survey
  - Long Period X-Ray Pulsars

Expected Detector Performance









GBM Burst Alerts